

Tree rings in ITL sensors

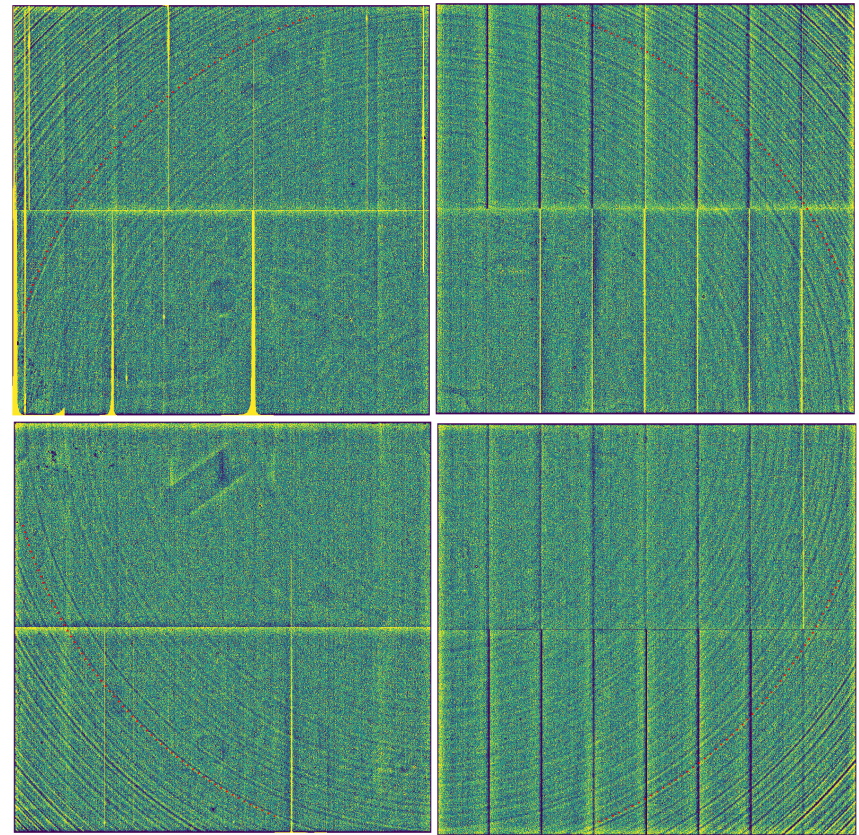
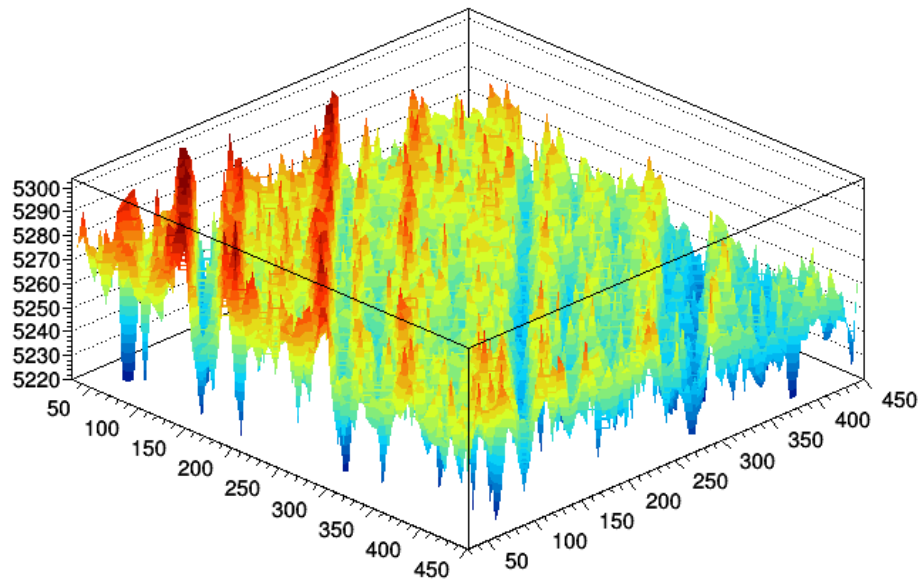
HyeYun Park

03/28/2017 10:00AM

Tree rings

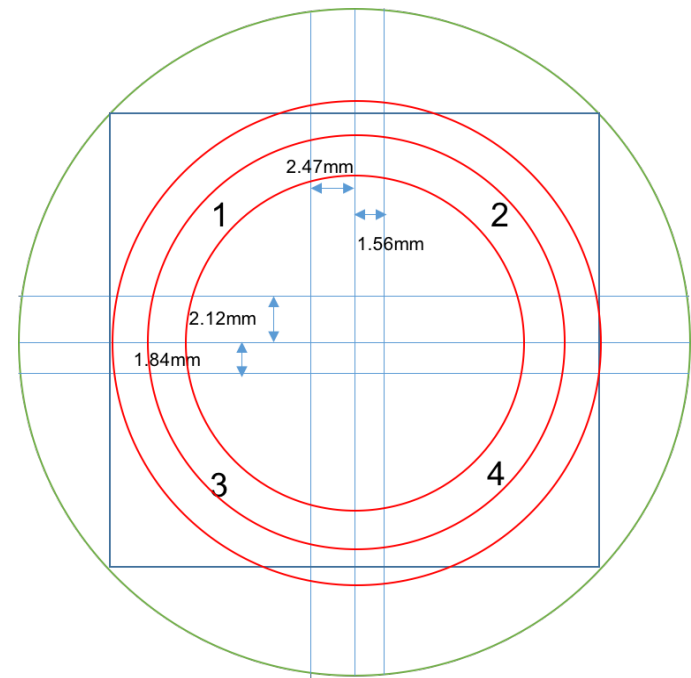
Dopant concentration

- > variation in electric fields
- > shape of sources distorted

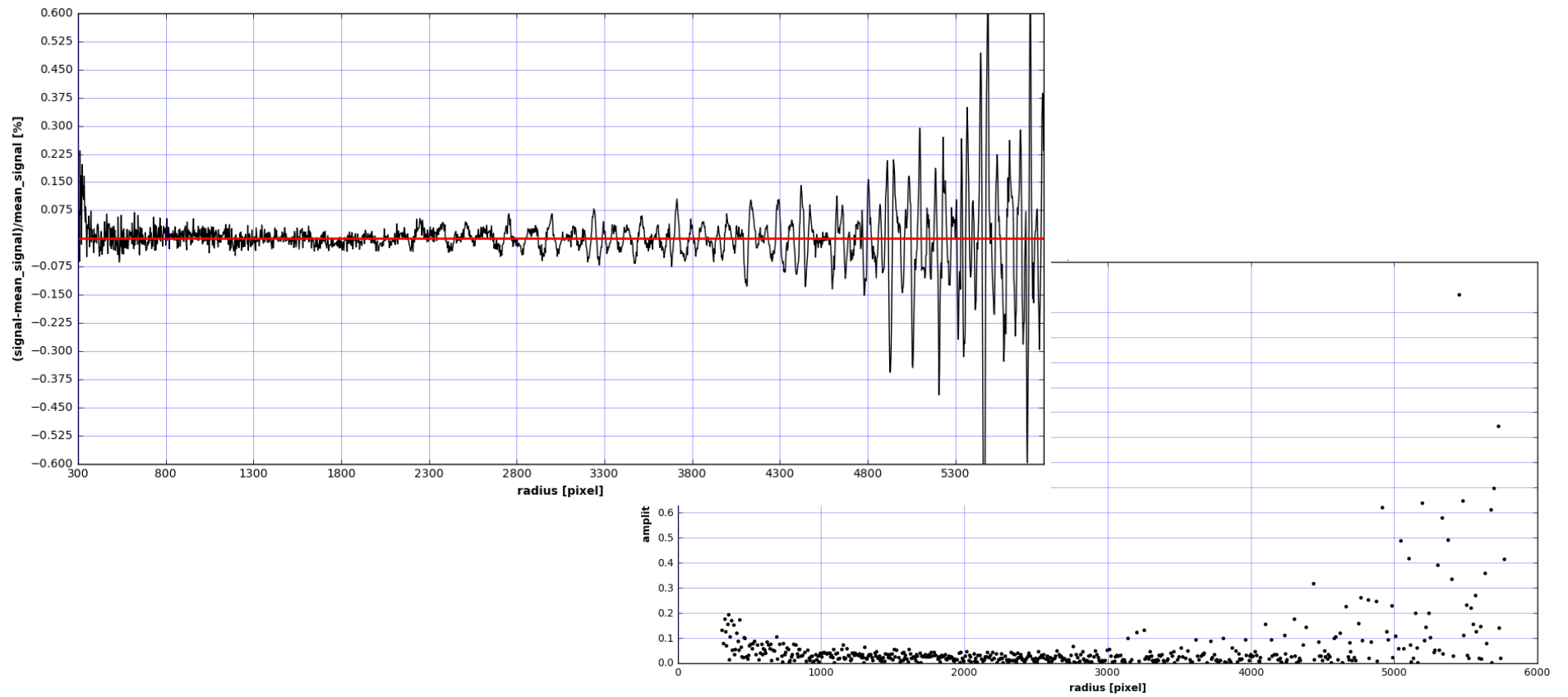


Method

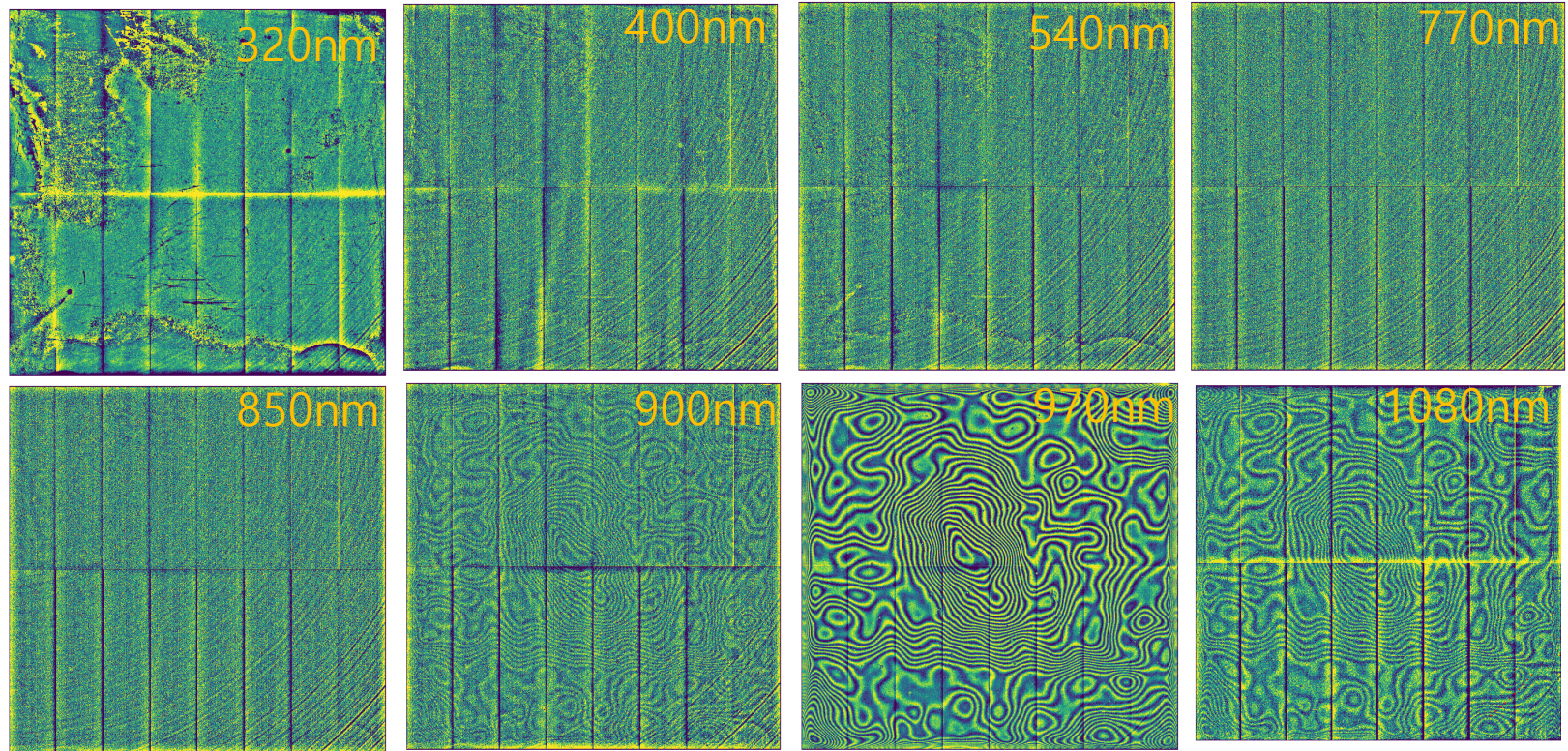
- Flat image reduction
 - Overscan subtraction & assemble
 - M.Fisher-Levine, AssembleImage
 - Mean flux subtraction & high frequency pattern chosen
 - D.Kirkby, AstroCCD
 - <https://github.com/dkirkby/AstroCCD>
- Finding center of rings
- Measure amplitudes of tree rings



Radius dependence

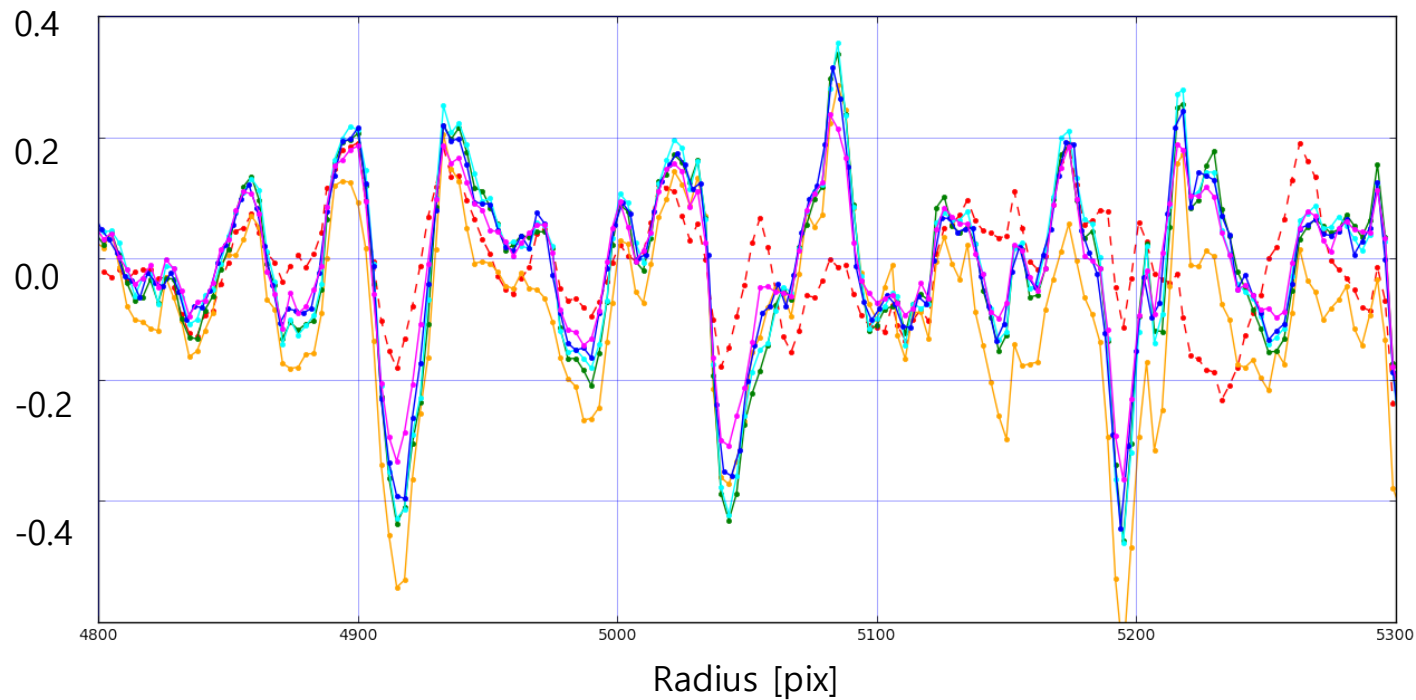


Wavelength dependence



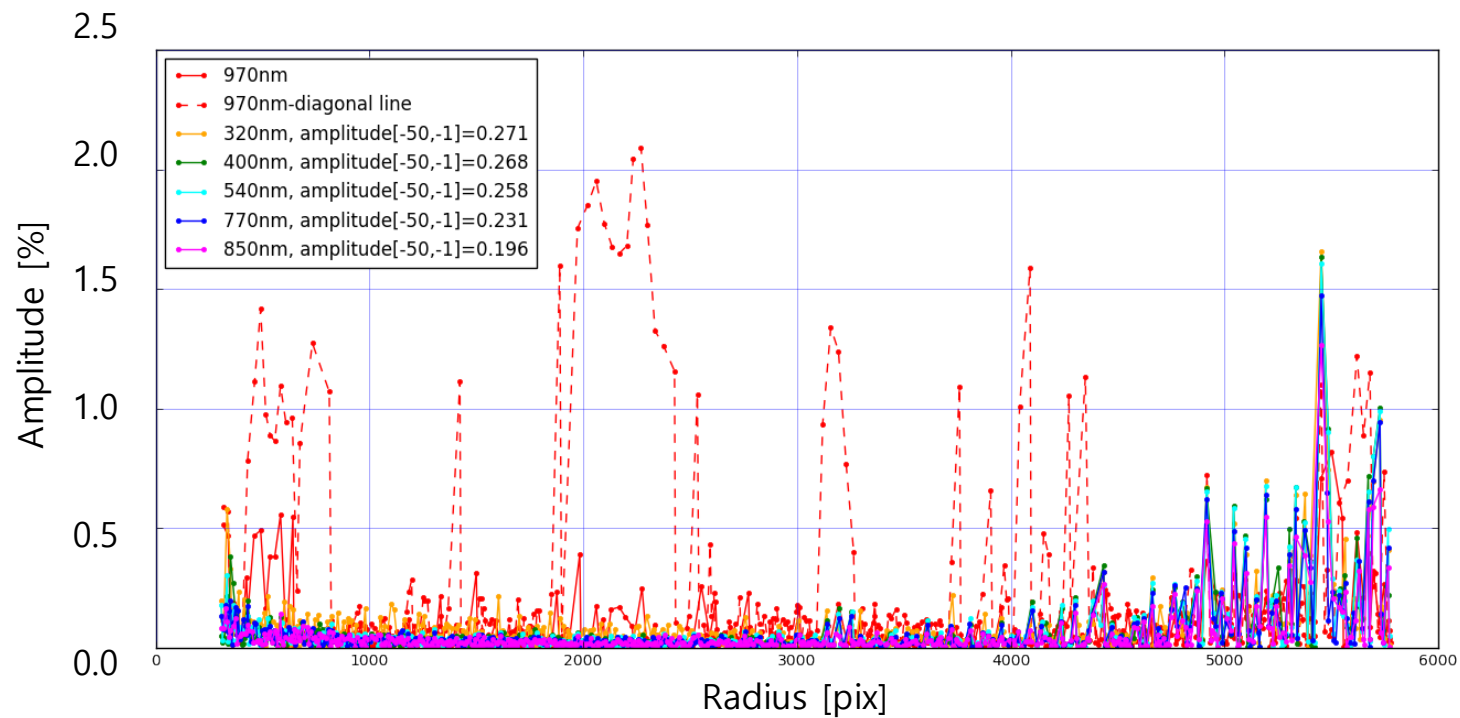
Wavelength dependence

$(\text{Signal} - \text{mean}) / \text{mean} \text{ [\%]}$



- Orange(320nm),green(400nm),cyan(540nm),blue(770nm),magenta(850nm), red(970)

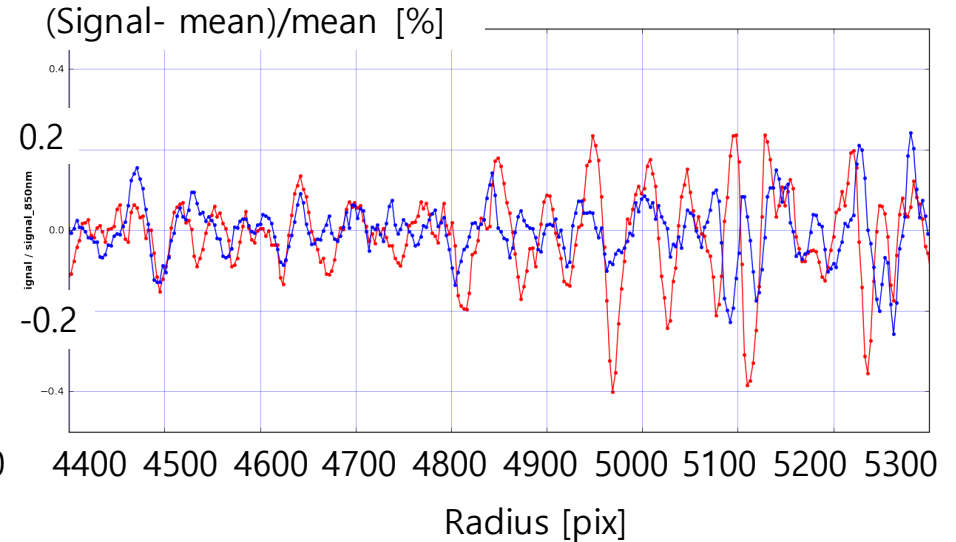
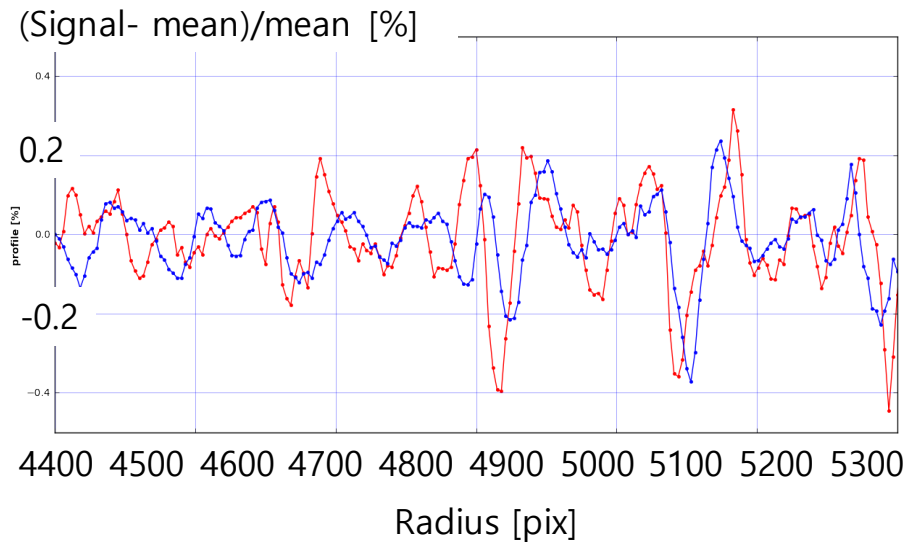
Wavelength dependence



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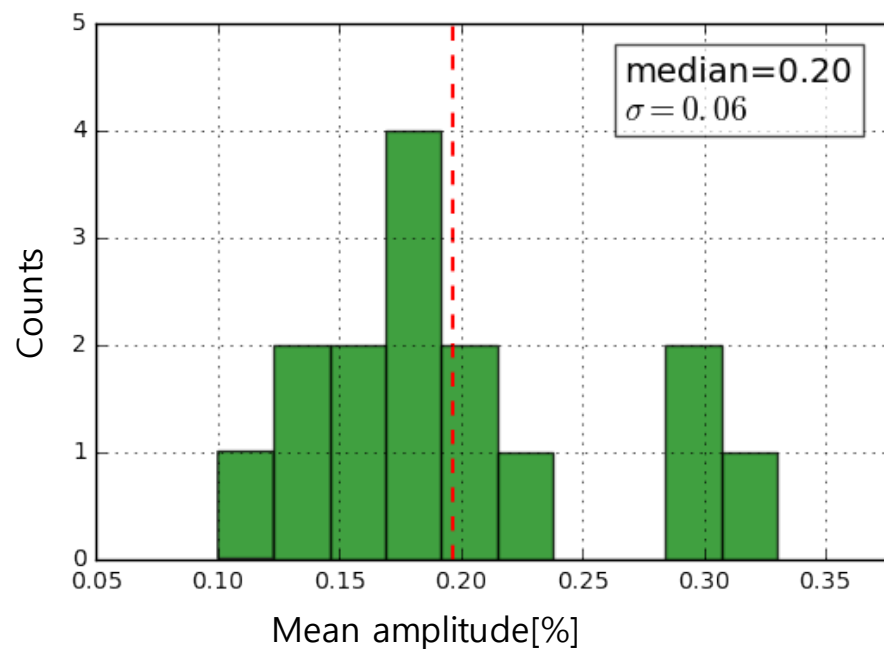
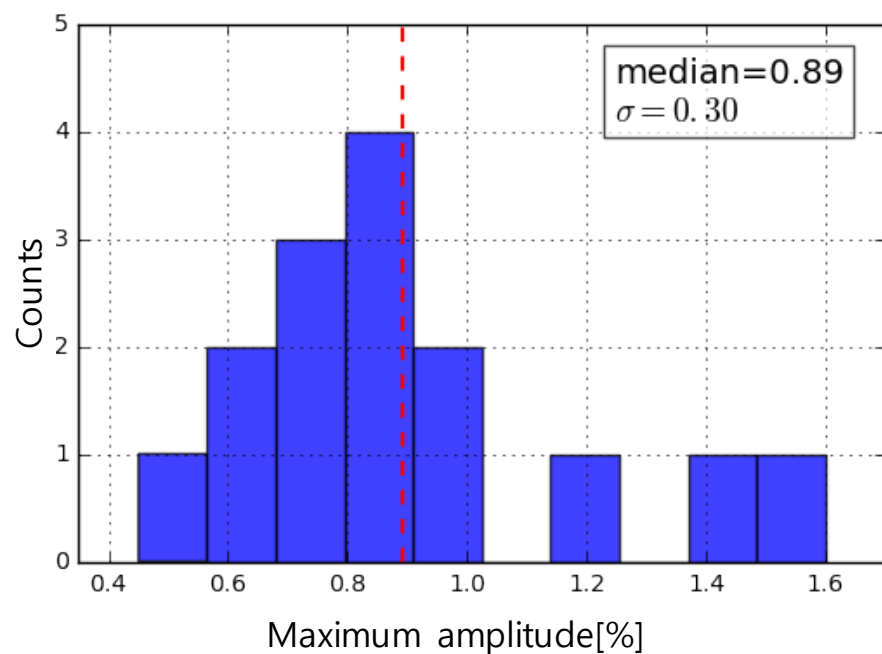
Compare sensors from same wafer

ITL-3800C-017&022 / ITL-3800C-145&107



Analyzing ITL sensors received at BNL

For last 20~10 points



Conclusion

- Amplitude gets larger from 0.1%~1.0% as it gets closer to outer part of the wafer.
- Since longer wavelengths penetrates deeper into the wafer, amplitude gets smaller for longer wavelengths.(mean amp 0.20%(850nm)~0.27%(320nm))
- Pair of sensors from same wafer has tree-ring patterns matched.
- 15 ITL sensors tested so far has mean value of 0.89% for maximum amplitude and 0.2% for mean over last 20~10 points.